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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,522	08/24/2006	Masayuki Okubo	2006_1361A	1027

513 7590 06/24/2009

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EXAMINER	
ANDREWS, MICHAEL	

ART UNIT	PAPER NUMBER
2834	

MAIL DATE	DELIVERY MODE
06/24/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,522	OKUBO, MASAYUKI	
	Examiner	Art Unit	
	MICHAEL ANDREWS	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 August 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/24/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is responsive to the Applicant's communication filed August 24, 2006. In virtue of this communication and the amendment concurrently filed:

- claims 1-7 were originally filed;
- claims 8-17 were added by the amendment; and thus
- claims 1-17 are now pending in the instant application.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawing Objections

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “line segments Lr” and the "middle points Cp" (claim 4, lines 2-3) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Disclosure Objections

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

4. The specification is objected to because of the following informalities:

- page 4, lines 1 and 11; replace "9-275652" with --9-275651.

Appropriate correction is required.

Claim Objections

5. Claims 9-12 are objected to because of the following informalities:

- line 1 of each claim; replace "toclaim" with --to claim--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

> be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asaka et al. (US 2004/0025323 A1), hereinafter referred to as "Asaka", in view of Shimizu (US 4,888,512).

With regard to claim 1, Asaka discloses a rotor for a brushless motor (see [0002], lines 1-4; also see figures 2 and 5-7 for all Asaka references) comprising a hollow-cylindrical rotor core [1, 2, 21, 22, 23] (see [0044], lines 1-6) to be fitted to a rotary shaft (see [0011], lines 4-6) and magnets [3] to be fitted to the outer peripheral surface of the rotor core (see [0042], lines 10-12), characterized in that the rotor core has:

an outer ring section [1] (see [0042], lines 10-12) formed to extend from the outer peripheral surface of the rotor core toward the rotary shaft with a predetermined thickness (see figure 7 for thicknesses);

a plurality of ribs [23] formed inside the outer ring section [1] and extending from the inner peripheral surface of the outer ring section [1] toward the rotary shaft (see [0042], lines 5-7); and

hollow sections [24] formed between the ribs [23] (see [0044], lines 5-6).

However, Asaka does not expressly disclose that the outer diameter φn of the hollow sections is defined by $\varphi c - 2 \times 3\,Wt \leq \varphi n \leq \varphi c - 2 \times 1.3\,Wt$, where φc is the outer diameter of the rotor core and Wt is the thickness of the magnets.

Asaka does disclose the outer diameter of the hollow sections and the outer diameter of the rotor core (shown in figure 7 as "130" and "170, respectively) as result-

effective variables whose values can influence the magnetic characteristics of the rotor. It is also well-known in the art that varying the diameters of the rotor core and hollow spaces can affect the torque produced and cooling characteristics of the motor. Further, Shimizu discloses a rotor with a permanent magnet where altering the thickness of the permanent magnet effects a change in surface magnetic flux density (see col. 5, lines 31-36 of Shimizu).

Thus, the general conditions of the claim, the outer diameter of the rotor core, the outer diameter of the hollow sections, and the thicknesses of the magnets are result-effective variables disclosed by the prior art. It would have been obvious to one of ordinary skill in the art to discover the optimum or workable ranges of said variables in order to maximize motor torque, improve motor cooling, or obtain a high motor efficiency.

With regard to claim 2, the combination of Asaka and Shimizu discloses the rotor according to claim 1, as stated above, except that the combination does not expressly disclose that the outer diameter φn of the hollow sections is defined by φc - 2 x 2 Wt ≤ φn ≤ φc - 2 x 1.3 Wt. However, it would have been obvious to one of ordinary skill in the art to discover the optimum or workable ranges of said variables, as stated above.

With regard to claim 3, the combination of Asaka and Shimizu discloses the rotor according to claim 1, as stated above, characterized in that the ribs [62] are radially formed at positions located inside the outer ring section [31] relative to the inter-magnet spaces of adjacently arranged magnets [33] or the inter-magnetic-polar spaces so as to

extend radially from the rotary shaft (see figure 6A of Asaka; the ribs are each centered between two of the magnets).

With regard to claim 4, the combination of Asaka and Shimizu discloses the rotor according to claim 3, as stated above, characterized in that the ribs [62] are arranged so as to be centered respectively at the line segments Lr passing through the middle points Cp of the inter-polar spans Pw of adjacently located magnets [33] and the center O of the rotary shaft (see figure 6A of Asaka; the ribs are each centered between two of the magnets).

With regard to claim 5, the combination of Asaka and Shimizu discloses the rotor according to claim 3, as stated above, characterized in that the angular pitch θr of arrangement of the ribs is larger than the central angle θm of the magnets, θr > θm (see figure 2A of Asaka). It is clearly shown that there are eight ribs and eight magnets positioned at equal angles (see [0044], lines 2-4 of Asaka), meaning that the angular pitch of the ribs must be 45 degrees. For the central angle of the magnets to be equal to or greater than 45 degrees, they would have to encompass the entire circumference of the outer section of the rotor. Since they do not, it is obvious that the central angle of the magnets is less than the angular pitch of the ribs.

With regard to claim 6, the combination of Asaka and Shimizu discloses the rotor according to claim 1, as stated above, characterized in that the hollow sections [24] are formed to show a substantially sector-shaped cross section (see figure 2A of Asaka)

and arranged on the prolonged lines passing through the polar centers of the magnets (see figure 6A of Asaka).

With regard to claim 7, the combination of Asaka and Shimizu discloses the rotor according to claim 1, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or 6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

With regard to claim 8, the combination of Asaka and Shimizu discloses the rotor according to claim 2, as stated above, characterized in that the ribs [62] are radially formed at positions located inside the outer ring section [31] relative to the inter-magnet spaces of adjacently arranged magnets [33] or the inter-magnetic-polar spaces so as to extend radially from the rotary shaft (see figure 6A of Asaka; the ribs are each centered between two of the magnets).

With regard to claim 9, the combination of Asaka and Shimizu discloses the rotor according to claim 2, as stated above, characterized in that the hollow sections [24] are formed to show a substantially sector-shaped cross section (see figure 2A of Asaka) and arranged on the prolonged lines passing through the polar centers of the magnets (see figure 6A of Asaka).

With regard to claim 10, the combination of Asaka and Shimizu discloses the rotor according to claim 3, as stated above, characterized in that the hollow sections [24] are formed to show a substantially sector-shaped cross section (see figure 2A of

Asaka) and arranged on the prolonged lines passing through the polar centers of the magnets (see figure 6A of Asaka).

With regard to claim 11, the combination of Asaka and Shimizu discloses the rotor according to claim 4, as stated above, characterized in that the hollow sections [24] are formed to show a substantially sector-shaped cross section (see figure 2A of Asaka) and arranged on the prolonged lines passing through the polar centers of the magnets (see figure 6A of Asaka).

With regard to claim 12, the combination of Asaka and Shimizu discloses the rotor according to claim 5, as stated above, characterized in that the hollow sections [24] are formed to show a substantially sector-shaped cross section (see figure 2A of Asaka) and arranged on the prolonged lines passing through the polar centers of the magnets (see figure 6A of Asaka).

With regard to claim 13, the combination of Asaka and Shimizu discloses the rotor according to claim 2, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or 6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

With regard to claim 14, the combination of Asaka and Shimizu discloses the rotor according to claim 3, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or

6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

With regard to claim 15, the combination of Asaka and Shimizu discloses the rotor according to claim 4, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or 6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

With regard to claim 16, the combination of Asaka and Shimizu discloses the rotor according to claim 5, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or 6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

With regard to claim 17, the combination of Asaka and Shimizu discloses the rotor according to claim 6, as stated above, characterized in that the width Wv of the ribs is smaller than the thickness Wt of the magnets, $Wv \leq Wt$ (see figures 2A, 5A, or 6A of Asaka). The width of the ribs is clearly shown in each figure as being significantly smaller than the width of the permanent magnets.

Citation of Relevant Prior Art

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art:

- Okubo et al. (US 2003/0230945 A1) discloses a rotor for a brushless motor;
- Tajima et al. (US 6,661,147 B2) discloses a rotor core with permanent magnets having specific radii and thicknesses;
- Burton (US 2002/0135252 A1) discloses a rotor core having a plurality of ribs inside an outer ring section.

Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Andrews whose telephone number is (571)270-7554. The examiner can normally be reached on Monday through Thursday between the hours of 8:30 and 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached at (571)272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/
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